```
┌─────────────────────────────────────────────────────────────┐
│            ZEBRA UNIVERSAL PROTOTYPING SYSTEM                 │
│                                                               │
│  FOR THE TS-1000, TS-1500, TS-2000, ZX-80, ZX-81, AND SPECTRUM│
└─────────────────────────────────────────────────────────────┘
```

Congratulations on your purchase of Zebra prototyping hardware.
We have designed it to be a reliable and easy to use system for
prototyping circuits for the Timex Sinclair computers.

WARNING

**Despite the system's simplicity, we urge you to read these
instructions and be very carefull.** If you solder the ZX
connector into the protocard with improper key orientation, it
will be very hard to correct the situation. Also, the ZX solder
tail connectors are made of strong but brittle beryllium-copper,
so they must be carefuly bent into proper position. Too sharp a
bend or repeated bending will cause them to break off. If you
follow these instructions you will do everthing correctly the
first time and not have any problems.

C111 BOARD COATINGS

The C111 Universal Prototyping Board has a green soldermask at
the bottom connector area. This mask helps you avoid
solder bridges between adjacent connector pads and also prevents
the C112 expansion connector PC from making unwanted electrical
contact with the prototype board connector traces. The remainder
of the C111 is coated with a special nonconductive flux to keep
the copper from oxidizing and aid in soldering.

C111 BOARD PATTERN

The C111 has a universal breadboarding pattern on 0.1 inch
spacings. The copper foil pattern consists of six vertical
columns of 28 horizontal strips each. The row widths alternate
between 0.3 and 0.4 inches to accomodate different IC widths.
Two main buss traces are provided for power and ground.

The connector area at the bottom of the board is 28 holes wide so
that it can accommodate the Spectrum 56-pin connector or the
ZX80, ZX81,TS1000 or TS1500 46-pin connector. Note that the slot
position is marked on the foil side and is the fith hole in from
the edge marked ZEBRA.

Just above the connector area are two other rows of 28 pads each.
These pads should be used to connect any desired signals from the
connector area to the universal pattern area. Note carefully
that the top pads go to the bottom connector row; the bottom pads
go to the top connector row.

The top part of the C111 has a single sided edge connector
pattern. Since the special board flux coating is nonconductive,
remember to remove it from this edge connector area with alcohol

Fig. 1A

C111
C110
TABLE

Fig. 1B

USE C112 AS TOOL TO BEND LEADS
C111
C110
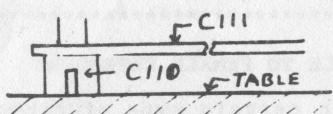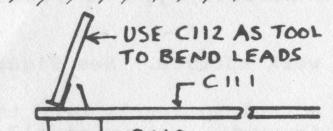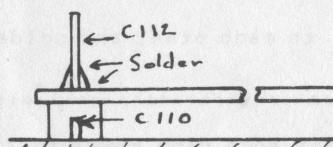
Fig. 1C

C112
Solder
C110

Assembling the ZEBRA Prototyping System
C110, C111, C112

Fig. 1D

SLOT
Solder
ZEBRA
Slot

Fig. 2A

C110

Fig. 2B

C112 USE AS BENDING TOOL
C110

Fig. 2C

C112
C110

Fig. 2D

SLOT

Assembling C110 to C112

FIG. 3

KEY POSITION
KEY POSITION
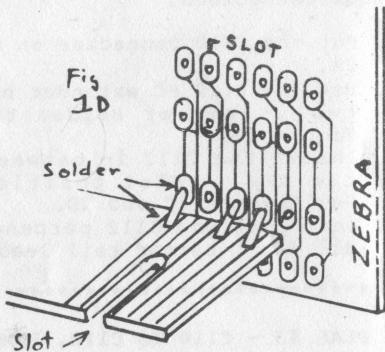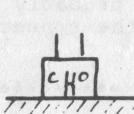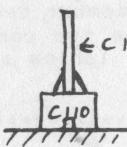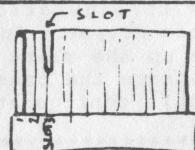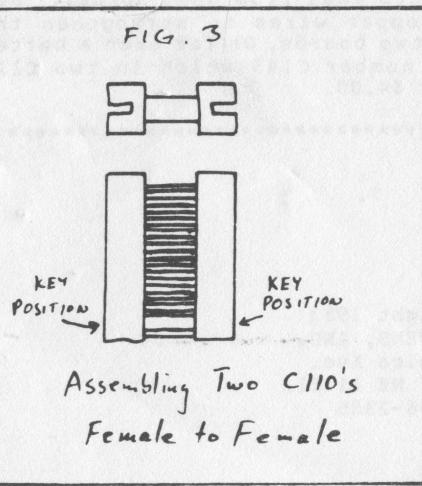
Assembling Two C110's
Female to Female

FIG. 4

Solder Small Bare Wires

SLOTS
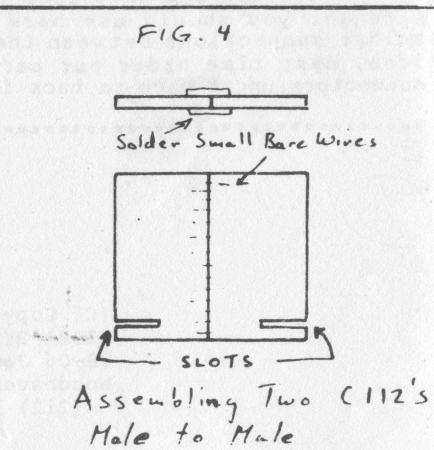
Assembling Two C112's
Male to Male

4

if you want to° use an edge connector on it. You will also probably want to notch the board or in some other way assure your connector will line up properly with these edge fingers.

C112 EXPANSION CONNECTOR

The expansion connector is simply a 2.4 inch by 5/8 inch double sided PC board with 23 traces on 0.1 inch centers on each side. The third position on one side is notched.

C110 KEYED & LABELED ZX CONNECTOR

The C110 connector is labeled on each side with the pin numbers and names of the TS-1000 and ZX-81 signals. The bars normally drawn above the signal names to indicate the inverted logic or "NOT", have been left out to ease the typsetting legibility. You should refer to your computer manual for the true sense of each signal. Note that the slot position, (third position in), has been keyed.

****

PLAN #1 - ASSEMBLING THE COMPLETE C110, C111, C112 SYSTEM

Inspect the C111 protocard copper pattern to make sure there are no copper burrs or foil pattern irregularities particularly in the soldermasked connector area. If there is a problem find it now.

Remove the C110 connector from its shipping foam remembering that its leads are brittle. Make sure all the leads are straight and then gently insert the C110 connector into the bottom two rows of holes on the C111 protocard. Make sure the connector slot, (position 3), matches up with the fifth row of holes marked "slot" on the copper foil side of the C111.

Place the C112 female connector and C111 protocard on a flat surface as in Figure A2 using a book or other object under one end to keep the card level. Use the C112 expansion PC connector as a tool and work it up and down the two rows of connector solder tail leads to bend them inward. Leave enough space to slide the C112 itself between the two rows of leads.

Position the C112 between the 2 rows of leads perpendicular to the C111 and make sure the slooted position on the C111 lines up with that of the C110. The slot on the C110 should face away from the C112 as in Figure A4. Allign the C110 leads with the C112 PC board and using a fine tip soldering iron, solder each of the 44 solder tail leads to the C112 protocard and then to the C111 expansion PC board. Double check your work for solder bridges and missed connections.

****

2

****

PLAN #2 - ASSEMBLING C110 TO C112 MALE TO FEMALE EXTENDERS

This configuration has some uses with certain type of ribbon cable connectors.

1. Put the C110 connector on a flat   work surface. See Figure 2A.
2. Use the C112 PC extender board as   a tool to gently bend the two   rows of solder tail leads inward   symetrically. Figure 2B.
3. Insert the C112 in between two   rows of C110's leads with the key   slot positions lined up with each   other. See Figures 2C and 2D.
4. Keep C110 and C112 perpendicular   to each other and solder all 44   solder tail leads.

****

PLAN #3 - C110 TO C110, FEMALE TO FEMALE EDGE CARD EXTENSION

This configuration can be used to convert a male output to a female output. Just remember two things: 1) you probably want to line up the slots on the two connectors and 2) you probably want to ignore the connector lables on at least one of the connectors in this configuration.

****

PLAN #4 - C112 TO C112, MALE TO MALE EDGE CARD EXTENSION

This configuration can be used to convert a female output to a male output. You probably want the to line up the slots on the two connectors but have them faces away from one another. For strenght you should use bare copper wires to strengthen the solder connections between the two boards. Or for even a better idea, next time order our part number C145 which in two C112 connectors uncut back to back for $4.00.

****